EXPRESS MAIL NO. EV256712020US

SUPPORT FRAME FOR DUCT

BACKGROUND OF THE INVENTION

1. TECHNICAL FIELD

The present invention generally relates to heating, ventilation, and air conditioning installations and, more particularly, to the supports used to hold the air ducts in place. Specifically, the present invention relates to a support frame for a duct that is installed in a vertical wall between studs.

2. BACKGROUND INFORMATION

Numerous air duct installations require a duct to be run in a vertical wall. One such installation is a cold air return duct that is run from the second floor of a house through the first floor wall into the basement. In this case, the duct passes through an opening formed in the second floor floor boards and an opening formed in the first floor floor boards. A metal duct is then positioned down or up through these openings between wall studs. This vertical section of duct must be securely held in place. In the past, the person installing the duct would have to fabricate custom holders on the job site from scrap material and use these holders to secure the vertical duct in place. Duct installers desire an improved support that obviates the need to custom form supports in the field.

BRIEF SUMMARY OF THE INVENTION

The invention provides a support frame configured to fit between wall studs. The support frame has a central opening adapted to receive a vertical air duct. The central opening may be rectangular or oval. Both openings are defined by upstanding flanges that are tilted inwardly toward each other to provide a frictional fit with the duct. The flanges are adjustable to accommodate ducts of different dimensions.

The invention also provides a frame having formed notches adapted to receive standard studs to properly position the frame and opening with respect to the studs.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

Fig. 1 is a perspective view of the support frame for a duct made in accordance with the concepts of the present invention.

Fig. 2 is a top plan view of Fig. 1.

Fig. 3 is a front elevation view of Fig. 2.

Fig. 4 is a side elevation view of Fig. 2.

Fig. 5 is a perspective view of a section of floorboard, floor joists, and wall studs with a duct opening formed in the floor boards between the wall studs.

Fig. 6 is a view similar to Fig. 5 showing a section of vertical duct being disposed in the duct opening with the support frame of the present invention being positioned between the wall studs.

Fig. 7 is a view similar to Fig. 6 showing the support frame of the present invention in an installed position.

Fig. 8 is a top plan view of the assembly of Fig. 7.

Fig. 9 is a section view taken along line 9-9 of Fig. 8.

Fig. 10 is a front elevation view of the vertical duct extending between a floor and a ceiling and held in place with a pair of the support frames of the present invention.

Fig. 11 is a perspective view of the support frame for an oval duct.

Fig. 12 is a top plan view of Fig. 11.

Fig. 13 is a front elevation view of Fig. 12.

Fig. 14 is a side elevation view of Fig. 12.

Similar numbers refer to similar parts throughout the specification.

DETAILED DESCRIPTION OF THE INVENTION

The support frame of the present invention is indicated generally by the numeral 10 in the accompanying drawings. Support frame 10 is used to hold the position of an air duct 12 in a wall 14 with respect to a floor board 16 as shown in Fig. 7. Support frame 10 is preferably fabricated from metal so that it will not burn or spread flames that may be disposed inside air duct 12. Support frame 10 is configured to fit between the wall studs 18 of wall 14 and center air duct 12 with respect to the duct opening 20 defined by floor 16. The person installing air duct 12 may thus easily position the upper and lower ends of air duct 12 as

shown in Fig. 10. Support frame 10 is provided in at least two embodiments for rectangular and oval ducts as shown in Figs. 1 and 11. Each embodiment is capable of supporting slightly different-sized ducts 12. Each embodiment is also adapted to substantially seal duct opening 20 to prevent air from leaking through duct opening 20 after air duct 12 is installed.

Support frame 10 includes a body 22 in the form of a thin plate. Body 22 defines a central opening 24 adapted to receive air duct 12. As such, opening 24 has an outer perimeter that is larger than the outer perimeter of air duct 12 so that air duct 12 may readily slide through central opening 24. Body 22 has a lengthwise direction and opposed ends at ends 26 at opposite ends of the lengthwise direction of body 22. Each end 26 defines a notch 28 that is adapted to receive a portion of wall stud 18. Central opening 24 is centered with respect to notches 28 allowing the user to properly locate central opening 24 with respect to wall studs 18 as depicted in Fig. 6. Body 22 thus extends beyond each wall stud 18 as depicted in Fig. 7 so that duct opening 20 is sealed by body 22 when support frame 10 is installed. In an alternative embodiment of the invention, the overall length of body 22 may be reduced and notches 28 may be eliminated. In this embodiment, the person installing frame 10 determines the position of body 22 between studs 18.

Support frame 10 further includes a flange 30 that extends up from body 22 adjacent opening 24. Flange 30 is angled inwardly with respect to opening 24 as shown in Figs. 2-4 and 12-14. In the rectangular embodiment of the

invention depicted in Figs. 1-4, flange 30 is provided in the form of four flange sections 32 that are disposed on opposed sides of rectangular opening 24. As depicted in Figs. 2-4, opposed flange sections 32 are angled toward each other. Flange sections 32 may thus pivot with respect to body 22 to accommodate differently-sized air ducts 12. The pivoting nature of flange sections 32 also provide a biasing force against air duct 12 to dampen vibrations and to help hold air duct 12 before connectors 34 are used to connect flange sections 32 to air duct 12. In the oval embodiment of support frame 10 depicted in Figs. 11-14, flange 30 is continuous about opening 24. Flange 30 is angled inwardly to define a frustum as shown in Figs. 13 and 14. The angled nature of flange 30 allows flange 30 in the oval embodiment of support frame 10 to accommodate air ducts 12 of slightly differing sizes. The angled nature also creates a biasing force against air duct 12 from flange 30 to dampen vibrations and to help hold air duct 12 in place before connectors 34 are installed. In either embodiment, flange 30 may include tabs 36 that extend from the upper end of flange 30. Tabs 36 are also angled inwardly as depicted in Fig. 14 and provide additional biasing force and adjustment capabilities to support frame 10. Each flange 36 defines at least one connector opening 38 adapted to receive connector 32. In the preferred embodiment, each connector opening 38 is adapted to receive a sheet metal screw 34 in a manner that allows the threads of the sheet metal screw to bite into tab 36. Flange 30 and tabs 36 may also be trimmed with appropriate cutters by the person installing air duct 12 if the outer dimension of

air duct 12 is too large to be received by flange 30. The user may also cut slits into flange 30 to increase its flexibility if needed.

Body 22 defines a plurality of connector openings 38 with a series of openings disposed in opposed lengthwise directions along the opposed lengthwise edges of body 22. Body 22 also defines one opening adjacent notch 28. Openings 38 may be adapted to receive sheet metal screws as described above or nails.

Support frame 10 is used with a duct installation assembly as shown in Figs. 5-10. Fig. 5 depicts the rough opening having opposed wall studs 18 extending up from floor board 16 on either side of a duct opening 20. The installer may position duct 12 up through opening 20 and then slide support frame 10 down over the end air duct 12. The user may also first install support frame 10 by positioning notches 28 about studs 18 and securing body 22 to floor 16 with appropriate connectors in a nature of screws or nails. In some cases, body 22 may also be secured with an appropriate adhesive. Once support frame 10 is secured, the user may push duct 12 up through central opening 24 until air duct 12 is properly positioned with respect to floor 16 and studs 18. The user may then connect flange 30 to air duct 12 with connectors 34 as depicted in Fig. 7. Figs. 7 and 8 show how support frame 10 seals opening 20 to prevent undesired airflow between different floors of the building. Fig. 10 shows how air duct 12 is securely held by support frame 10 on different floors of the building.

Although the installation drawings show support frame 10 used with a rectangular duct, the same steps may be used to install an oval duct. The oval embodiment of support frame 10 is also intended to be used with round ducts by changing the shape of central opening 24 and flange 30. In this application, the term oval includes shapes having straight sidewalls and curved ends as shown in Fig. 12, circular shaped, and egg or elliptical shapes.

Body 22 may be fabricated in standard 16 inch lengths to fit between standard wall studs 18. The 16 inch length allows support frames 10 to be used with adjacent studs without overlapping the ends of body 22. The dimensions of central opening 24 may be varied so that support frame 10 will work with different sized ducts 12. Central opening 24 should remain centered between the ends and sides of body 22 regardless of the dimensions of central opening 24.

In the foregoing description, certain terms have been used for brevity, clearness, and understanding. No unnecessary limitations are to be implied therefrom beyond the requirement of the prior art because such terms are used for descriptive purposes and are intended to be broadly construed.

Moreover, the description and illustration of the invention is an example and the invention is not limited to the exact details shown or described.